NAEB

Engineering Newsletter

NATIONAL ASSOCIATION OF EDUCATIONAL BROADCASTERS

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TV TECHNICAL TIPS (April)

—Cecil S. Bidlack

The first week in March I spent at Redwood City, Calif. Here I had the opportunity to take the five-day factory training course covering the operation and maintenance of the Ampex Videotape Recorder. Three days were devoted to the study of schematics and block diagrams of the various chassis employed in recording the video and audio signals of a TV program on magnetic tape. For the last two days of the course, the students go through the setup procedure as outlined in the comprehensive instruction manual furnished with each recorder.

The Ampex Videotape Recorder consists of two standard racks of electronic equipment and the console, which contains the transport mechanism and other electronics. All rack and console wiring is completed at the factory. In fact, the racks are bolted together and shipped that way. Each recorder is placed in operation and given a final test at the factory to see that it meets operating specifications before shipment. When the equipment arrives at its destination and is uncrated, installation consists of hooking it up to the 60-cycle AC power circuits, making video connections and the rack-to-console wiring. This latter wiring is a very simple job with only three interconnecting cables involved, two of which terminate in factory-mounted spade type terminal strips which connect to appropriate terminals in the end of the console. The third cable contains ten coaxial cables which require soldered connections to the proper console terminal. Once these connections are made, you are ready to begin the initial check-out procedure which is detailed step by step in the instructional manual.

For proper set-up and maintenance, a dual trace is required on the test oscilloscope. Ampex recommends a Tektronix Model 541 with a dual input pre-amplifier and also a high gain pre-amplifier unit for certain other tests. A reference tape for initial tests is supplied with each unit as well as a micrometer depth gauge for measuring head protrusion from the rotating drum. A standard test tape is being developed which will be supplied with all machines. Degaussing is accomplished at present with the conventional bulk type unit now used for erasing audio tapes, since the recorder has no erase head. An accessory unit is now being developed which will make degaussing an automatic process for consistent erasure.

The recording tape has been vastly improved over that orginally used. At one time rejections sometimes ran over 90 per cent of the tape supplied to the user. At present there is only one method of testing the tape and that is by recording a video signal and playing it back. This practice is recommended when a new reel of tape is received. We used one reel of tape for tests during the week, erasing it manually when the occasion demanded. I saw no evidence of drop-outs, which were once the major defect making the tape unfit for use.

To enable the tape to be spliced, an "edit" pulse is laid down along the bottom edge of the tape over the control track. These pulses are "developed" by applying a carbonyl iron powder suspended in a volatile fluid to the coated side of the tape. This solution dries rapidly and the tape is cut by the use of

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a razor blade, a straight edge and a splicing jig furnished with the machine. The cut is made parallel with the "swipe" of the head across the tape and on the edit pulse. The edit pulses are timed so that the splice comes during vertical blanking to eliminate picture roll over or noise due to the splice. The present splicing jig is but a milled plate to align the tape so that the cut may be made at the proper angle. We saw an engineering model of a splicer which will be of considerable advantage, where splicing and editing is required. Since the head tips, when new, protrude less than four mils from the drum, a special splicing tape must be used which is very thin. It also must be applied to the back of the tape without wrinkles since the tolerance between the tape guide and drum is but a few thousandths of an inch.

At the time of our visit to Redwood City, over fifty video tape recorders had been produced and the machines were coming out of final test at a rate of one per day. Ampex expects to have its initial production run completed and in the hands of users well in advance of the advent of Daylight Saving Time April 27. Training classes consist of no more than ten students. Ours had an international flavor, with a representative of Siemens-Halske, a German firm which will handle export distribution, an engineer from a Havana station, and representatives from TV stations in Boston, New York, San Antonio, Lubbock, Tex., and Los Angeles, besides the writer. We believe it was time well spent. Our only regret is that we will not be able to put the training obtained to immediate use in educational television.

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The February 1958 *RCA Broadcast News* contains a comprehensive twenty-six-page article on WUNC-TV at Chapel Hill, N. C. It is profusely illustrated and has diagrams of the microwave relay system used to connect the studios in Raleigh, Greensboro and Chapel Hill to the transmitter near the latter studio. Audio and video block diagrams are included as well as the video schematic which is common to all studios.

The same issue of *Broadcast News* contains a brief article by A. H. Lind and a block diagram showing how a color television signal is processed for recording on a video tape recorder.

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We see by *Radio-TV Daily* that WOSU-TV has recently put into service two complete remote units (a total of four cameras) to telecast special events. It is also expected that these units will be used for instructional purposes, either by closed circuit or broadcast on the Ohio State University station WOSU-TV. All of which brings up a point we've been wanting to mention for some time.

It would be nice to hear from our readers occasionally and also to be included when publicity releases are sent to the press regarding new equipment or other technical improvements. We'd like to know, too, whether anyone besides Ralph Townsley at Purdue has purchased any of the used image orthicons from NBC which we announced in a December mailing and also in the January *Newsletter*. Purdue liked the first four 5820's they received so well, they immediately ordered four more. We do appreciate the notes some of you have written but we'd like to hear from more of you. With 31 ETV stations now on the air it's difficult to make frequent visits, so drop us a line to tell us of the progress you're making and pass along any items you think would interest others.

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The FCC is proposing to add a new section to Part 4 of its rules and regulations to provide for licensing low powered auxiliary transmitters used to transmit cues and orders to production personnel and participants of broadcast programs. The proposed rules provide for operation in the 26.10 - 26.48 MC and 450 - 451 MC bands.

Plate power input to the final *rf* amplifier is limited to one watt. No operator's license is required of the person actually using these low powered units, provided that a licensed operator is on duty at the place of operation. A Radiotelephone first or second class operator license is required when any adjustments or changes are made which would affect the proper operation of the transmitting units. Call letters will not be assigned, however adequate records must be kept of the periods and place of operation. Comments on this proposal, Docket No. 11696, are due April 15, 1958, with reply comments due ten days later.

TV TECHNICAL TIPS (May)

Thirty engineers from educational television stations and production centers will attend the NAEB Video Recording Workshop to be held May 5 - 9 in the studios of WTTW, the Chicago Educational Television Assn. station. The Workshop is made possible by a grant from the Ford Foundation and is sponsored by NAEB to provide attending engineers an apportunity to increase their technical knowledge and ability in video recording.

Much of the programming supplied educational television stations by the ETRC, Ann Arbor, Mich., is recorded on film by the kinescope process. While

a major portion of the workshop program will be devoted to kinescope recordings of television programs, a comprehensive technical description of the Ampex Videotape Recorder will be given, followed by a demonstration of the equipment at WGN-TV, The Chicago Tribune station, where installation has just been completed. The possibility of a change to recording programs on magnetic tape is one that has intrigued educational station administrators since the initial announcement of this process two years ago. Over one hundred of these video tape recorders will be in service at network centers and commercial stations by the end of this month.

Highlighting the five-day program will be talks and demonstrations by representatives of broadcasting networks, equipment manufacturers, and allied services, as well as a number of speakers drawn from the ranks of education TV broadcasters.

The program of the workshop covers studio practices affecting kinescope recording, camera adjustment procedures, kinescope set-up procedures, standardization and control measures, film characteristics, densitometry, printing and processing quality control, as well as film laboratory practices. Other topics to to be discussed are calibration and measurement equipment, sound pick-up, monitoring, equalization, and film editing. Several periods have been set aside for group discussion of problems arising from changing film stock and processing laboratories, unusual techniques and equipment modifications, experiences in dealing with film laboratories and the economics of kinescope recording.

The Workshop has been arranged and participants selected by the NAEB Engineering Committee whose chairman is Carl H. Menzer, director of WSUI-KSUI. Program details have been arranged by Duane Weise, director of engineering for WTTW and Cecil S. Bidlack, NAEB TV Engineer, coordinator for the workshop.

The following persons are scheduled to attend:

Nelson Alquist, kinescope recording engineer, WKNO-TV, Memphis Community TV Foundation; Samuel A. Barbour, chief engineer, WHYY-TV, Metropolitan Philadephia Educational Radio and Television Corporation Corp.; Rob R. Beldon, chief engineer, WILL-AM-FM-TV, University of Illinois; William Boehme, School of Journalism and Communications, The University of Florida; John L. Boor, director of engineering, KTCS (TV), University of Washington; John Cullen, chief engineer, KRMA-TV, Denver Public Schools; Roderick Davis, chief engineer, TV Center, The University of Kansas; Adolph S. Dvorak, chief engineer, KUON-TV, University of Nebraska; Herbert Evans, chief engineer, WTHS-FM-TV, Dade County Board of Public Instruction, Miami; Edward W. Furstenberg, WHA-TV, University of Wisconsin; Harold D. Gorsuch, TV technical supervisor, WOSU-TV, Ohio State University; Edward Graham, Jr., chief engineer, WGTV, Georgia Center for Continuing Education, University of Georgia; Lawrence R. Griewski, studio technical supervisor, University of Michigan; James R. Leonard, chief engineer, WCET, Greater Cincinnati TV Educational Foundation; Floyd Malott, chief television engineer, Radio and Television Communications, Indiana University; Joseph Martel, recording supervisor, META, Inc., New York; Vorce C. McIntosh, chief engineer, University TV and Radio, The University of New Mexico; George L. Murphy, chief engineer, Educational Television, Auburn Polytechnic Institute; Robert Nissen, studio supervisor, KQED, Bay Area Educational Television Assn., San Francisco; C. D. Phillips, chief engineer, Television Center, State University of Iowa; Merlyn D. Rawson, chief engineer, Department of Telecommunications, University of Southern California; Edward Reed, KTCA-TV, Twin City Area Educational Television Corp.; R. Taylor Rogers, WUNC-TV, The University of North Carolina; Ralph Seitle, kinescope supervisor, WTTW, Chicago Educational Television Assn.; John Soergel, chief engineer, Radio and Television Center, Syracuse University; Glen Southworth, chief engineer, KWSC, The State College of Washington; Joseph E. Stuckey, chief engineer, Broadcasting Services, University of Alabama; Linn Towsley, chief engineer, WKAR-TV, Michigan State University; James Wulliman, chief engineer, WMVS-TV, Milwaukee Vocational and Adult Schools; Paul Yacich, kinescope supervisor, WDSU-TV (representing WYES-TV), New Orleans.

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The NAEB Engineering Committee met in Chicago March 17 and 18. Many subjects were discussed and among them was the promotion of interest among engineers in NAEB and attendance at the NAEB national convention. This year, the convention is being held in Omaha, Neb., October 14 - 17.

A number of NAEB stations are within easy driving range of Omaha. If we were to schedule a meeting of technical personnel for an afternoon, many of you could drive there in the morning, meet in the afternoon and drive home that evening. It would give us a chance to get together, get acquainted, have a special program planned at the convention, or if you choose, no program—just a talk session.

It's also been suggested that we could do the same thing at regional meetings or, in the absence of a regional meeting, we could get together on our own. Such a meeting was held at WBEZ in Chicago on June 10, 1954. We don't have any figures on who attended or how many; however from the August, 1954 *Newsletter,* this meeting was adjudged a success and it was suggested that similar meetings might be held on an annual basis.

We'd like to get an expression of opinion on holding such a meeting either at the NAEB convention or on a regional or even a state basis. We hope the person who receives this *Newsletter* will call this to the attention of his technical staff and give us its reaction.

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Another item discussed at the engineering committee meeting concerned NAEB Educational Television Scholarships. (See article on p. 5) A grant from the Ford Foundation permits us to offer scholarship awards from $75 to $300 to employees of operating ETV units (stations or production centers) to permit attendance at workshops, summer sessions or regular university sessions. To date, no technical employee has been granted one of these scholarships for the simple reason that none has applied. We can't go into the details of the application or other requirements here, but we have the information all compiled in a four-page leaflet and if you're interested

we'll gladly send you one. There's no reason why such funds cannot be granted to technical personnel and we invite you to apply if you're interested in furthering your technical knowledge through a course of study.

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We don't have complete details but RCA has announced a new vidicon camera tube, type 7038. It is a one-inch diameter tube, capable of 600 line resolution and can be used for color, monochrome, live or film cameras in broadcast or industrial service. It is more sensitive than previous types, delivering broadcast picture quality with as little as one foot-candle illumination on the face plate.

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WRFK-FM at the Union Theological Seminary is increasing power and will soon have a Gates 10-watt FM transmitter tuned to 91.1 mc. for sale. If you're interested contact Robert White Kirkpatrick, Director, WRFK-FM, Union Theological Seminary, Richmond 27, Va.

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We hope you saw the article in *Radio and TV News* for April by Glen Southworth of KWSC, Pullman, Wash. It gives the constructional details on how to "Use Your TV Set as a Oscilloscope," which we described briefly in the August, 1957 *Newsletter* and the subsequent September *Engineering Newsletter*. Congratulations, Glen! We hope this will inspire others at educational stations to follow your example. We'd like to see more of our technical personnel participating in the activities of professional engineering societies, presenting papers at their meetings and contributing to their journals.

TV TECHNICAL TIPS (June)

Judging from the comments received to date from two-thirds of the participants, the NAEB Video Recording Workshop was an unqualified success. It was held May 5 - 9 in the studios of WTTW, the Chicago Educational Television Assn. station. From the get-acquainted session Sunday evening to the close of the workshop Friday noon, the exchange of ideas and experiences was an almost continuous process. We did provide a few hours each night for sleeping, however many of the evening sessions continued over a glass of brew at the Cottage Bar of the Shoreland until a late hour.

Most participants mentioned how much the presence of Rodger Ross and Harold Wright of the Canadian Broadcasting Corporation added to the program of the Workshop. I was more than pleased when they accepted the invitation to attend and especially happy that they could be with us for the entire period. We are not only indebted to CBC for making it possible for us to have the benefit of their knowledge and experience, but as well to all organizations from the broadcasting and film industries whose representatives contributed much to the success of the workshop program.

In addition to providing much practical information which the participants can incorporate in their own operations, the workshop highlighted three areas of work for the NAEB Engineering Committee:

1) Investigation leading to a standard film reproduction characteristic
2) Densitometer standardization
3) Utilization of EIA grayscales to establish studio exposure practices.

At the completion of the first item, it is then believed that we shall be in a position to re-evaluate the print density requirements for kinescope recordings as established by ETRC and perhaps to establish negative density requirements to produce these prints with standard laboratory exposure and development procedures.

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The past month has been one of almost continuous travel for the writer. Such a schedule isn't the most conducive for the production of a column like this, not because of the lack of new experiences or ideas but simply because deadline dates seem so close together.

Regardless of the present implementation of the video tape recording process for television programming, three papers were presented at the SMPTE meeting in Los Angeles on kinescope recording. These along with the seven presented on video tape recording should appear soon in the SMPTE *Journal*. A total of 82 papers were presented during the week with the program somewhat heavier on the motion picture side, as is usual for the west coast convention.

At the NAB meeting the following week, broadcasting again came into its own with many new or improved items being shown. Ampex was demonstrating both monochrome and color video tape recorders; Gates was showing a new 1 kw AM and a 1 kw FM transmitter with Multiplex. General Electric had its new 3-image orthicon color camera in operation, as well as a new monochrome image orthicon camera and live and film vidicon cameras. They were also showing a transistorized (except for output tubes) sync generator and a newly designed audio console.

RCA displayed, for the first time, AM and TV automation equipment, a new TV switcher in which the switching is done by transistors (relays incorpor-

ated are for tally lights only), and a new magnetic disc recorder which will record 70 seconds at 45 rpm. They were also demonstrating their studio vidicon camera and a color camera and showing the RCA color video tape recorder transport mechanism. Sarkes-Tarzian had complete film and live studio control equipment set up and in operation. There were many other exhibitors displaying lighting, transmitting, studio, control and accessory equipment.

The 12th Annual NAB Broadcast Engineering Conference session occupied two-and-a-half days of the four-day meeting where an excellent program of papers covering AM, FM and TV subjects were presented. Due to lack of space, the broadcasting equipment was exhibited at both the Statler and Biltmore Hotels. Due to this geographical separation and also due to the fact that there were several exhibition rooms at each hotel as well as exhibits in hotel rooms, as we look back we find we did not locate some of them. Since the Video Recording Workshop began the following Sunday, our time at NAB was necessarily shortened.

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Following the workshop we spent four days at the IERT in Columbus. This year, the equipment display was larger than the previous year. ITA—Industrial Transmitters and Antennas—was demonstrating a 10-watt fm transmitter as well as displaying 50-watt and 250-watt fm transmitters. Motorola was showing its new "Classroom 21," a TV receiver developed especially for classroom use. This receiver is designed both for "off-the-air" or rf reception as well as to accept video and audio feeds from a closed circuit studio without modification. It is provided with a custom designed stand on wheels, featuring an adjustable tilt to minimize reflections as well as a separate 8-inch speaker to provide excellent sound quality from the front.

Dage Division of Thompson products was demonstrating a newly designed miniature TV camera, Model 333. It is completely automatic with no operating controls and self contained in a case (without optics) 2 ⅜" x 5⅜" x 7¾". The camera is of modular construction and weighs approximately four pounds.

BOX SCORE

Total AM Stations -	**3239**	(includes	**39**	non-commercial)
Total FM Stations -	**687**	(includes	**157**	non-commercial)
Total TV Stations -	**587**	(includes	**32**	non-commercial)

NEW STATIONS

WNPS (AM)	New Orleans, Louisiana
WBWC (FM)	Berea, Ohio
KNME-TV	Albuquerque, New Mexico

It operates on 10 watts power input from practically any source and its output is composite video or modulated rf, or both as required, with standard RETMA sync, 525 lines, 60 fields per second, pictures fully interlaced, or other special sweep rates, as required.

Other exhibitors included Tele-Cam, Inc. of Pittsburgh whose equipment WQED used in the production of the Encyclopedia Brittanica Science Series; RCA, showing their TK-15 vidicon camera equipment; Sarkes-Tarzian with a complete live and film studio control set-up; Zenith showing AM, FM and TV receivers; Century Lighting, Teleprompter, National Theatre Supply demonstrating the new GPL vidicon equipment; and DuMont with a display of industrial TV equipment for educational use.

To complete the list of exhibitors, there were displays by WOSU-TV, NBC and NAEB, as well as promotional materials and descriptive literature from many educational radio and television stations.

ETV STATIONS ON THE AIR

KCTS	Seattle, Wash.	9
KETA	Okla. City, Okla.	13
KETC	St. Louis, Mo.	9
KLSE	Monroe, La.	13
KNME	Albuquerque, N. M.	5
KOAC-TV	Corvallis, Ore.	7
KQED	San Francisco, Calif.	9
KRMA-TV	Denver, Colo.	6
KTCA-TV	St. Paul, Minn.	2
KUED	Salt Lake City, Utah	7
KUHT	Houston, Tex.	8
KUON-TV	Lincoln, Neb.	12
WAIQ	Andalusia, Ala.	2
WBIQ	Birmingham, Ala.	10
WCET	Cincinnati, Ohio	48
WETV	Atlanta, Ga.	30
WGBH-TV	Boston, Mass.	2
WHA-TV	Madison, Wis.	21
WHYY-TV	Philadelphia, Pa.	35
WILL-TV	Urbana, Ill.	12
WIPR-TV	San Juan, P. R.	6
WKAR-TV	East Lansing, Mich.	60
WKNO-TV	Memphis, Tenn.	10
WMVS-TV	Milwaukee, Wis.	10
WOSU-TV	Columbus, Ohio	34
WQED	Pittsburgh, Pa.	13
WTHS-TV	Miami, Fla.	2
WTIQ	Munford, Ala.	7
WTTW	Chicago, Ill.	11
WTVS	Detroit, Mich.	56
WUNC-TV	Chapel Hill, N. C.	4
WYES-TV	New Orleans, La.	8

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